

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

FIRST LIST OF THE FISHES OF THE VICINITY OF
PLUMMERS ISLAND, MARYLAND.

BY W. L. McATEE AND A. C. WEED.

INTRODUCTION.

Plummers Island lies in the Potomac River, nine miles above the City of Washington, D. C. It has been the home of the Washington Biologists' Field Club since 1901. The study of its fauna and flora and to some degree that of the surrounding region, is one of the principal objects of the Club.

The present paper brings up to date the information on the fish fauna of this region. Collecting of fishes has been carried on with varying degrees of activity since 1905. The earlier work was done by W. L. McAtee assisted at times by Dr. A. K. Fisher, H. S. Barber, and W. H. Osgood. In 1912 A. C. Weed and W. L. McAtee collected vigorously, and much assistance was received at that time and since by J. D. Shafer, keeper of Lock No. 11, on the Chesapeake and Ohio Canal.

REGION TREATED.

For our survey of the fish fauna of the vicinity of Plummers Island we have selected as our faunal area that section of the Potomac River between Little Falls and Great Falls together with its tributary streams (see map, Plate I). Plummers Island is almost midway of this stretch of the river, which is clearly marked off as a faunal unit. The river between these two falls is deep and with considerable current as a rule; there are several important rapids and the bottom is rocky and rugged. Conditions thus are unfavorable for aquatic vegetation, a great factor in modifying the fish fauna. To any one acquainted with the

Potomac River, the contrast between Little River or Eastern Branch or even the main stream near Washington, with a wealth of water plants, or of the broad shallow stream so characteristic above Great Falls, with the section we are now treating, needs no emphasizing.

This portion of the river is further strongly characterized by the distribution of the anadromous fishes. Three species of herrings and two of sturgeons ascend to Little Falls but no further, while the shad, striped bass and white perch enter this section of the river only to be stopped by Great Falls.

DIFFICULT RUN, VA.

Our plans for collecting in Difficult Run were thwarted, and this is particularly unfortunate as Difficult is the largest creek system in our area. We are able to present only a brief list of species taken near the mouth. The upper course of this stream is the only water in our region known to be inhabited by the brook trout.

LIST OF FISHES.

<i>Lower part</i>	<i>Upper part</i>
Ameiurus catus	Salvelinus fontinalis
Semotilus atromaculatus	
Rhinichthys atronasus	
Lepomis auritus	
“ gibbosus	
Micropterus dolomieu	

In ponds on the rocky headland just below Difficult Run sun-fishes are very abundant. In the clear water a school of a hundred or more may be seen scrambling for a single morsel of food. The species noted are *Lepomis auritus*, *L. solis*, *L. gibbosus*, *L. cyanellus*, and *Chaenobryttus gulosus*.

SCOTTS RUN, VA.

About ten miles west of the center of the City of Washington is an irregular ridge of from 400 to 500 feet elevation, whose surficial rocks belong to the Lafayette formation. This ridge has a total length of about $3\frac{1}{2}$ miles and is the source of several of the largest creeks in the region. Here head an important branch of Difficult Run, Scotts Run, Pimmit Run, which joins the Potomac at Chain Bridge, Four-mile Run, emptying above

Alexandria, Holmes and Cameron Runs, which unite and flow into the river just below that city, and Accotink Creek, emptying five miles below. The distance between the mouths of the creeks at the extremes of this system, measured along the river, is 24 miles.

Scott's Run, the only one of this group in which we are especially interested in the present connection, has a total length of approximately $4\frac{1}{2}$ miles. It drops into the river over a fall 25 feet above low water mark and within a half a mile from its mouth has a total descent of about 100 feet. The mouth is about $1\frac{1}{2}$ miles above Plummers Island.

LIST OF FISHES.

<i>Below the fall</i>	<i>Above the fall</i>
<i>Pimephales notatus</i>	<i>Catostomus commersonii</i>
<i>Notropis amoenus</i>	<i>Semotilus atromaculatus</i>
" <i>analostanus</i>	<i>Leuciscus vandoisulus</i>
" <i>hudsonius</i>	<i>Rhinichthys atronasmus</i>
<i>Lepomis auritus</i>	" <i>cataractae</i>
" <i>gibbosus</i>	<i>Boleosoma olmstedii</i>
<i>Micropterus dolomieu</i>	
<i>Boleosoma olmstedii</i>	

DEAD RUN, VA.

Dead Run has its source at Mackall Hill at an elevation of 300 feet, has a total length of about $2\frac{1}{2}$ miles and empties into the river about $\frac{1}{4}$ mile below Plummers Island. The stream falls about 120 feet in the last half mile of its course.

LIST OF FISHES.

<i>Below falls</i>	<i>Above falls</i>
Various river fishes occasionally run in, as catfishes, sunfishes, and black bass.	<i>Semotilus atromaculatus</i> <i>Rhinichthys atronasmus</i>

TURKEY RUN, VA.

This stream heads near Langley, Va., at an elevation of 240 feet. Its total length is about $1\frac{1}{2}$ miles, and its descent in the last half mile of its course is about 100 feet.

LIST OF FISHES.

<i>Below falls</i>	<i>Above falls</i>
<i>Hypentelium nigricans</i>	<i>Hybognathus nuchalis</i>
<i>Semotilus atromaculatus</i>	<i>Semotilus atromaculatus</i>
<i>Pimephales notatus</i>	<i>Leuciscus vandoisulus</i>
<i>Notropis amoenus</i>	<i>Rhinichthys atronasmus</i>
“ analostanus	
“ cornutus	
“ hudsonius	
<i>Ericymba buccata</i>	
<i>Campostoma anomalum</i>	
<i>Lepomis gibbosus</i>	
<i>Boleosoma olmstedii</i>	

DISCUSSION OF VIRGINIA CREEKS.

Difficult Run is excluded because we know so little of its fauna. It is distinguished from all of the other creeks by possession of the brook trout.

Abrupt descent near the mouth is a striking characteristic of the other Virginia creeks and it is the chief factor in determining the nature of their fish fauna. Scotts Run, with an initial single obstacle 25 feet in elevation and a steep series of rapids immediately adding 75 feet more, nevertheless has the largest number of species occurring above the falls. The writers feel sure this is due to other factors than feasible water connections or climbing abilities of the fish. An old mill now stands about a mile from the mouth of the creek, and it is possible that small fishes collected elsewhere for bait may have been released above the dam or in the race supplying the mill. Other agencies of transportation and other motives are conceivable.

The more normal conditions are represented by Dead and Turkey Runs. Dead Run falls 120 feet in its last half mile in a series of rapids which includes one particularly long steep waterslide with never more than a thin sheet of water running over it. Only those redoubtable climbers, the fall fish (*Semotilus atromaculatus*) and the black-nosed dace (*Rhinichthys atronasmus*) have surmounted these obstacles. Repeated investigations of the upper reaches of the brook have revealed no other species.

Turkey Run, although falling 100 feet in its last half mile has no single fall of any magnitude. Its plunge into the river is by means of a large number of small rapids. This probably explains why two more species (*Hybognathus nuchalis* and

Leuciscus vandoisulus) were able to reach the upper part of the stream than was the case in Dead Run. There is little probability that there has been any meddling by mankind with the fish fauna of these two streams.

ROCK RUN, MD.

Rock Run has its source near Potomac, and after a course of about 5 miles, no part of which is precipitous, empties into the Potomac just below Lock 11 of the Chesapeake and Ohio Canal. This run flows under the canal through a large culvert. Here the stream is shallow and of comparatively uniform depth; it flows from the culvert in a thin sheet and drops about 18 inches into a deep pool. In time of flood river water backs into this culvert; nevertheless large fishes running in from the river do not as a rule go above this pool. Scores of *Catostomus* and *Moxostoma* are netted here every spring. The culvert marks very well the boundary between the true creek fauna and the intruders from the river.

The following have been taken only *in or above* the culvert:

<i>Semotilus atromaculatus</i>	<i>Rhinichthys cataractae</i>
<i>Leuciscus vandoisulus</i>	<i>Boleosoma olmstedii</i>
<i>Notropis cornutus</i>	<i>Etheostoma flabellare</i>

The following species have been taken only *below* the culvert:

<i>Moxostoma macrolepidotum</i>	<i>Chaenobryttus gulosus</i>
<i>Anguilla rostrata</i>	<i>Lepomis cyanellus</i>
<i>Ambloplites rupestris</i>	“ <i>gibbosus</i>

The following species have been taken *both above and below* the culvert:

<i>Schilbeodes insignis</i>	<i>Rhinichthys atronasus</i>
<i>Catostomus commersonii</i>	<i>Exoglossum maxillingua</i>
<i>Hypentelium nigricans</i>	<i>Lepomis auritus</i> (only one small specimen taken in culvert.)
<i>Pimephales notatus</i>	Probably accidental; this fish clearly belonging to the deeper water fauna)
<i>Notropis amoenus</i>	
“ <i>hudsonius</i>	

CABIN JOHN RUN, MD.

Cabin John Run rises near Rockville, and has a total course of about $7\frac{1}{2}$ miles. It also flows through a culvert under the canal, and it is at this point that most of the following species were collected:

Schilbeodes insignis	Notropis amoenus
Catostomus commersonii	“ analostanus
Hypentelium nigricans	“ cornutus
Semotilus corporalis	Ericymba buccata
“ atromaculatus	Rhinichthys atronasus
Leuciscus vandoisulus	“ cataractae
Notemigonus crysoleucas	Hybopsis kentuckiensis
Pimephales notatus	Exoglossum maxillingua
Notropis proce	Percopsis omiscomaycus
“ hudsonius	Boleosoma olmstedii
“ arge	Etheostoma flabellare

CANAL.

The Chesapeake and Ohio Canal, if left undisturbed, would soon become a fish paradise. It supports an abundant growth of submerged vegetation, something the river in this region almost entirely lacks. However it is drained every winter and fish can not become permanently established. Although this is bad for the fishes, it is very good for collectors, and our records are practically complete up to date. However, owing to the way in which the canal is filled (diversion of river), its length, and the number of tributaries, something new may turn up at any time. Our notes refer to the level between locks 11 and 12, a stretch bordering the property of the Washington Biologists' Field Club.

LIST OF SPECIES.

Ictalurus punctatus	Dorosoma cepedianum
Ameiurus catus	Esox reticulatus
“ nebulosus	Pomoxis sparoides
Schilbeodes insignis	“ annularis
Carpionodes cyprinus	Ambloplites rupestris
Catostomus commersonii	Chaenobryttus gulosus
Hypentelium nigricans	Lepomis cyanellus
Erimyzon sucetta oblongus	“ auritus
Cyprinus carpio	“ gibbosus
Notemigonus crysoleucas	Micropterus dolomieu
Notropis hudsonius	Perca flavescens
“ amoenus	Boleosoma olmstedii
Rhinichthys cataractae	Morone americana
Anguilla rostrata	

CHANNEL BETWEEN PLUMMERS ISLAND AND MARYLAND SHORE.

In low water this channel is narrow enough to be crossed in a single step at three different places. At such a stage the water

flows two ways from a point at the western end of the island where is the mouth of a small creek; the maximum depth is about 8 feet. During floods a broad strong current sweeps through this channel, the water often rising as much as 15 feet above the ordinary level.

This channel is used as a breeding place by black bass, sun-fishes and catfishes.

LIST OF SPECIES.

<i>Ictalurus punctatus</i>	<i>Ericymba buccata</i>
<i>Ameiurus catus</i>	<i>Rhinichthys atronasmus</i>
“ <i>nebulosus</i>	<i>Hybopsis kentuckiensis</i>
“ <i>natalis</i>	<i>Anguilla rostrata</i>
<i>Schilbeodes insignis</i>	<i>Dorosoma cepedianum</i>
<i>Catostomus commersonii</i>	<i>Pomoxis sparoides</i>
<i>Semotilus atromaculatus</i>	“ <i>annularis</i>
<i>Notemigonus crysoleucas</i>	<i>Chaenobryttus gulosus</i>
<i>Pimephales notatus</i>	<i>Lepomis cyanellus</i>
<i>Notropis amoenus</i>	“ <i>auritus</i>
“ <i>analostanus</i>	“ <i>gibbosus</i>
“ <i>cornutus</i>	<i>Micropterus dolomieu</i>
“ <i>hudsonius</i>	“ <i>salmoides</i>
	<i>Boleosoma olmstedii</i>

THE MAIN RIVER.

The Potomac between Great Falls and Little Falls is characterized by its rocky shores and bed, its numerous rapids, alternating with deep stretches and its exceedingly irregular bottom. There is almost no aquatic vegetation. Off Plummers Island soundings of 80 feet have been obtained; at ordinary stages the river here is about 100 yards wide. A mile above the island is a rather important rapid known as Stubblefield Falls; a small rapid begins a quarter of a mile below.

The names of many fishes inhabiting the main river need not be repeated here, as a complete list would include all species previously recorded for the lower reaches of brooks as well as those found in the channel behind Plummers Island. All of these must at times travel about in the river, and collections in the main river, no matter where, would yield some of them. The following species include those which so far as known are confined to the main river, together with several (starred) whose place of occurrence it is desirable to definitely record.

LIST OF SPECIES.

* <i>Petromyzon marinus</i>	* <i>Perca flavescens</i>
<i>Ictalurus furcatus</i>	* <i>Stizostedion vitreum</i>
* <i>Carpiodes cyprinus</i>	<i>Roccus lineatus</i>
* <i>Erimyzon sucetta oblongus</i>	* <i>Morone americana</i>
<i>Alosa sapidissima</i>	

RESTRICTION OF FISHES TO CERTAIN PARTS OF OUR AREA.

The brook trout is confined to Difficult Run, probably because that stream was the first resort found in the down-stream journey by some pioneers or waifs from the normal mountain home of the species. *Campostoma anomalum* and *Hybognathus nuchalis* have so far been collected only in Turkey Run; both should be found elsewhere. *Boleosoma effulgens* has been found at Little Falls; if it occurs in the upper part of these rapids it may fairly be considered as a species of our area. *Percopsis omiscomaycus* has been collected only in Cabin John Run; and *Exoglossum maxillingua* and *Etheostoma flabellare* shared by this stream and Rock Run have not been found elsewhere. The pickerel (*Esox reticulatus*) has been taken only in the canal. The river alone harbors the shad, and the striped bass, and has yielded the only specimens so far caught of the sea lamprey, forked-tailed catfish, and pike-perch. The carp sucker (*Carpiodes cyprinus*), chub sucker (*Erimyzon sucetta oblongus*), the yellow perch, and white perch, have been taken in both the canal and river but nowhere else, and the mud-shad (*Dorosoma*) has been collected only in the channel behind Plummers Island and in the canal.

ECOLOGY OF SOME OF THE FISHES.

Some of the above-mentioned restrictions in distribution are no doubt due to ecological conditions; others can not be so explained. A fact impressed upon one when seining the various brooks is the extent to which the upper courses of the creeks are monopolized by the fall fish (*Semotilus atromaculatus*) and the black-nosed dace (*Rhinichthys atronasus*). These fishes are of general distribution but it is evident that they are expert climbers. They do not ascend streams merely to spawn for the upper reaches of the brooks always have a certain population of these two species. *Etheostoma flabellare* was found only in shallow

riffles; *Exoglossum*, *Leuciscus* and *Rhinichthys cataractae* were usually in swirling pools just beneath miniature cataracts.

ANNOTATED LIST OF SPECIES.

PETROMYZONIDÆ.

Petromyzon marinus Linnaeus.—A lamprey about 18 inches long was found dead on rocks at the lower end of Plummers Island, May 14, 1905. The species must frequently occur in our waters as it commonly clings to shad on their run up the river.

SILURIDÆ.

Ictalurus furcatus (Le Sueur).—An introduced species. Our only definite record is for two specimens taken in the river April 28, 1912.

Ictalurus punctatus (Rafinesque).—Spotted cat. Introduced, abundant in the main river. The largest specimen taken weighed 8 pounds and individuals of from 2 to 4 pounds are common. One weighing $4\frac{1}{4}$ pounds was caught on a hook baited with an 8 inch fish of the same species. The young are most distinctly spotted. The members of the species found in the channel between Plummers Island and the Maryland shore and in the canal are usually under 2 pounds in weight. Examination of a few stomach contents resulted as follows:

May 17, 1907. The stomach and intestines were filled with seeds of the white elm (*Ulmus americanus*), about 400 of which were present. These constituted 98 per cent of the food. The remaining 2 per cent consisted of: 1 snail, 1 ant, 1 *Dryops lithophilus*, 1 mandible of hellgramite (*Corydalis cornutus* larva), and a few other fragments of insects.

May 18, 1907. One stomach contained the head and skin of an eel which had just been thrown in the river, and the intestines were full of macerated elm seeds. The stomach of another specimen also was filled with the last mentioned material.

July 4, 1908. Ninety per cent of the contents of a stomach was made up of adult mayflies (*Hexagenia bilineata*). A few stone-fly larvae, a beetle (*Stenelmis*), and vegetable debris including bits of juniper twigs and a seed of *Smilax rotundifolia* made up the remainder.

Ameiurus catus (Linnaeus).—Mississippi or Channel cat. Common in the river.

Ameiurus nebulosus (Le Sueur).—Mud cat. Abundant, particularly in the channel behind Plummers Island and in the canal. A pair had their nest in the channel near the ferry in the summer of 1912. Both adults constantly guarded the nest, as they did also the carefully herded young for a fortnight or more. When the canal is drained young catfish of this species are to be seen in large numbers. In December, 1913, about a solid half bushel of mud cats, 6 to 8 inches long, were seen in a single small pothole. Apparently each was striving to get to the bottom of the mass, so that all were in constant motion. This performance lasted for days and weeks, and so far as could be observed, without cessation.

Ameiurus natalis (Le Sueur).—Yellow cat. Occasionally taken in the channel behind Plummers Island.

Ameiurus nebulosus and *A. natalis* from this region are not nearly so well differentiated as they are, for example, in Lake Ontario. The information at hand does not show whether or not this is a case of hybridization under the somewhat unnatural conditions of the Plummers Island Channel.

Schilbeodes insignis (Richardson).—Red-eyed cat. Occurs in Rock Run, Cabin John Run, the river and canal. A specimen of near the maximum size for the species was taken on hook and line in Sycamore Cove, September 4, 1911.

CATOSTOMIDÆ.

Carpiodes cyprinus (Le Sueur).—American carp. Occasional in the river and rare in the canal.

Catostomus commersonii (Lacépède).—Yellow sucker. White sucker. Hickory shad. Common everywhere in the river and larger creeks; occasional in the canal. Large numbers ascend Rock Run in March and April.

Hypentelium nigricans (Le Sueur).—Black sucker. Spotted sucker. Stone roller. Taken in the river, and in Rock, Cabin John and Turkey Runs. Large individuals are caught in Rock Run in spring, and specimens are sometimes found in the canal.

The name *Hypentelium* which has been used subgenerically seems to us to be worthy of generic rank. *Catostomus* is distinguished among the suckers by having the air bladder *large* and divided into two parts. In *Hypentelium* the air bladder is rudimentary. The cranium of *Hypentelium* is much shorter and broader than in any species of *Catostomus* and the pectoral fins are set lower and carried horizontally instead of vertically as in most fishes (see Plate II). *Hypentelium* is developed as a bottom fish and seems to us to be much farther removed from *Catostomus* than is *Pantosteus*.

Erimyzon sucetta oblongus (Mitchill).—Mountain sucker. Chub sucker. Rare in river and canal.

Moxostoma macrolepidotum (Le Sueur).—Large specimens are caught in Rock Run in April.

CYPRINIDÆ.

Cyprinus carpio (Linnaeus).—Carp. Abundant in the river and fairly numerous in canal. The largest specimen from the vicinity of Plummers Island examined was 27 inches long and weighed $7\frac{3}{4}$ pounds.

Campostoma anomalum (Rafinesque).—Two taken in Turkey Run, Va., March 27, 1912. Not hitherto recorded from this region.

Hybognathus nuchalis Agassiz. Taken only in Turkey Run.

Semotilus corporalis (Mitchill).—Our only records are for Cabin John Run.

Semotilus atromaculatus (Mitchill).—Horned chub. Abundant in all the creeks, particularly in their upper courses. Found also in shallow

parts of the river. A specimen taken in Dead Run, May 9, 1907, had only damselfly nymphs in the stomach and intestines.

Leuciscus vandoisulus Cuvier and Valenciennes.—Common in all the large creeks, except Dead Run where it has not yet been taken.

Notemigonus crysoleucas (Mitchill).—Roach, Mill Roach. Common in the canal and river, also taken in Cabin John Run.

Pimephales notatus (Rafinesque).—Abundant in shallow parts of river and about the mouths and in the lower reaches of creeks.

Notropis procne (Cope).—Taken only in Cabin John Run.

Notropis hudsonius amarus (Girard).—Shiner, Smelt. Common in most of the creeks, in shoal portions of the river and in the canal.

Notropis arge (Cope). Specimens provisionally identified as this species have been collected in Cabin John Run.

Notropis amoenus (Abbott).—Common in most of the creeks and in Plummers Island channel. Taken in the canal February, 1914.

Notropis photogenis (Cope).—Plummers Island channel October 15, 1905. Rock Run, March 10, 1912.

The differential characters of the three preceding species are so obscure and recent investigations have thrown so much doubt on the subject that we are unable to decide whether the specimens should be referred to one species or to three or more.

Notropis analostanus (Girard).—Has been taken in Cabin John, Scotts and Turkey Runs and in Plummers Island channel.

Notropis cornutus (Mitchill).—This species has been collected in Plummers Island channel, and in Rock, Cabin John and Turkey Runs. Specimens taken in Rock Run March 17, 1912, exhibited the breeding colors.

Ericymba buccata (Cope).—Collected in Plummers Island Channel July 14, 1906, about 5 years before it was recorded as an inhabitant of this region. Also taken in Cabin John and Turkey Runs.

Rhinichthys cataractae (Cuvier and Valenciennes).—Collected in Rock, Cabin John and Scotts Runs. Not rare. Taken in the canal February, 1914.

Rhinichthys atronasmus (Mitchill).—An ubiquitous species, most common in creeks, especially their upper courses.

Hybopsis kentuckiensis (Rafinesque).—This species has been taken in Plummers Island channel, in the canal and in Cabin John Run.

Exoglossum maxillingua (Le Sueur).—Tongue chub, Black chub, Nigger perch. Common in Rock and Cabin John Runs.

ANGUILLIDÆ.

Anguilla rostrata (Le Sueur).—Eel. Abundant in river and canal, goes little beyond the mouths of creeks. The largest specimen seen was 3 feet long.

DOROSOMATIDÆ.

Dorosoma cepedianum (Le Sueur).—Mud shad. Single specimens have been taken in Plummers Island channel (October 15, 1905), and

in the canal (December 14, 1913). The largest individual was 10½ inches long over all.

CLUPEIDÆ.

Alosa sapidissima (Wilson).—Shad. Ascends the Potomac to Great Falls, hence is transient in our waters. Shad are still caught in dip nets both at Great and Little Falls; formerly some fishing of this nature was done at Stubblefield Falls.

SALMONIDÆ.

Salvelinus fontinalis (Mitchill).—Brook trout. In 1899 Smith and Bean published the following remarks about the brook trout: "In former years this fish inhabited Difficult Run, on the Virginia side of the Potomac, below Great Falls, but was supposed to have been long since exterminated. Recently, however, a few have been taken in this stream." (P. 184).

ESOCIDÆ.

Esox reticulatus (Le Sueur). Pike. Trout. Of occasional occurrence in the canal.

PERCOPSIDÆ.

Percopsis omiscomaycus (Walbaum).—Smith and Bean (p. 185) state that this species has been taken in Cabin John Run.

CENTRARCHIDÆ.

Pomoxis sparoides (Lacépède).

Pomoxis annularis Rafinesque.—These two introduced species are indiscriminately referred to as Crappie. They are about equally common and occur both in the river and canal. A specimen of *annularis* caught May 19, 1907, measured 13¼ inches over all.

Ambloplites rupestris (Rafinesque).—Goggle-eye. Introduced, has been collected in Rock Run and in the canal.

Chaenobryttus gulosus (Cuvier and Valenciennes). Introduced, has been taken in Plummers Island channel, in Rock Run and the canal. A specimen caught in Rock Run, April 7, 1912, has in many ways the appearance of a hybrid. It has the shape of head, dentition, scaling and fin count of *Chaenobryttus* and the color and body form of *Lepomis cyanellus*. An apparent hybrid with *Lepomis gibbosus* was taken in a pool near Difficult Run, June 11, 1911.

Lepomis cyanellus (Rafinesque).—Introduced and fairly common. Has been taken in Plummers Island channel, in Rock Run and the canal. Occurs also in some of the pools near Difficult Run.

Lepomis auritus (Linnaeus).—Bream, Brim. Abundant in the river, canal and the mouths of creeks. Several nests of this species were observed in Plummers Island channel during the latter half of June, 1908. They were guarded by the males but were finally abandoned as the water lowered before hatching occurred. The stomachs of specimens

caught in Sycamore cove, September 18, 1910, contained caterpillars of *Heterocampa manteo* and *Ceratonia amyntor*, and an adult locustid, *Scudderia furcata*.

Lepomis solis (Cuvier and Valenciennes).—Bean and Weed (p. 173) comment on the status of *solis* and state that it probably should stand as a separate species. If recognized as anything more than a variety, it will have to so stand as it occurs with *auritus* under conditions where the two forms could not breed true, except for the intervention of a physiological difference sufficient to prevent cross-breeding. A case in point is the colonies of sunfishes in pools on a rocky headland just below Difficult Run. The abundance of *Lepomis* in these water pockets is such that we may say they are saturated with sunfishes. *Gibbosus*, *cyanellus auritus* and *solis* occur here and one is as recognizable and distinct as the other. *Chaenobryttus gulosus*, however, seems to hybridize with all.

Lepomis gibbosus (Linnaeus).—Punkin seed. Abundant in the river, canal, and in the pools above mentioned, and occasional in the mouths of creeks.

Micropterus dolomieu (Lacépède).—Black bass. Introduced, common in the river, sparingly distributed in the canal.

Micropterus salmoides (Lacépède).—Introduced. The only definite record for our region is a capture on hook and line in the Plummers Island channel, September 13, 1911.

PERCIDÆ.

Perca flavescens (Mitchill).—Yellow perch. Ring perch. Occurs in both the canal and river, sometimes rather commonly in the latter.

Stizostedion vitreum (Mitchill).—One specimen was caught in the river April, 1913.

Boleosoma olmstedii (Storer).—Abundant and almost omnipresent. Darters as a rule are lovers of rocky riffles and swift currents, but this species is often found on mud bottom in deep pools and in canal locks. Specimens taken in Rock Run March 17, 1912, appeared to be nearly ready for spawning.

Boleosoma effulgens (Girard).—Recorded by Smith and Bean from Little Falls and as it occurs in the rapids themselves it fairly belongs in our list.

Etheostoma flabellare (Rafinesque).—Not uncommon in Rock and Cabin John Runs.

SERRANIDÆ.

Roccus lineatus (Bloch).—Striped bass. This species ascends the river to Great Falls. A few small specimens have been caught on hook and line in the vicinity of Plummers Island.

Morone americana (Gmelin).—White perch. The white perch runs up the Potomac as far as Great Falls. The main run occurs in spring but individuals linger in our waters and they may be captured at almost any season. We have collected this species both in the river and the canal.

The last two species and the shad exemplify gradations of a fundamentally simple habit. All are anadromous, and ascend the river primarily to spawn. The shad do not linger after performing this function and the young apparently soon leave the upper river. Adults of the striped bass behave about the same while young of various sizes linger in these waters. The adults of white perch, however, are apparently at home in our waters, and some of them are present throughout the year.

SUMMARY.

Of the 54 species in the above list 10 are known to have been introduced into the Potomac and possibly some of the others were. The known introductions include two species of catfish, the carp, two crappies, the goggle-eye, the warmouth, one sunfish, and two kinds of bass.

Approximately 83 per cent of the species belong to five families of fishes, while the remainder, 9 species in all, represent 8 families. The Cyprinidæ or minnow family ranks first with 19 species; the other important families are sunfishes and bass (*Centrarchidæ*), 10 species; catfishes (*Siluridæ*), 6 species; and suckers (*Catostomidæ*), and perches (*Percidæ*) with 5 each.

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